

# Closeness of convolutions of probability measures

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We discuss a new explicit bound for the total variation distance between two convolution products of  $n$  probability distributions, one of which having identical convolution factors. Special emphasis is given to the approximation by the  $n$ -fold convolution of the arithmetic mean of the distributions under consideration. We are interested in bounds with magic factors, i.e. roughly speaking  $n$  also appears in the denominator. As an application, we consider the multinomial approximation of the generalized multinomial distribution. It turns out that here the order of some bounds given in Loh (1992) and Roos (2001) can significantly be improved. In particular, it follows that a dimension factor can be dropped. It should be mentioned that Loh used the famous Stein method in a more general situation of dependent random variables. However, it seems to be unclear, whether Stein's method can be used to reproduce the results of the present paper.

References:

Loh, W.-L., Stein's method and multinomial approximation, *Ann. Appl. Probab.*, 2, 1992, 536-554.

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